



# Practice Patterns of Antibiotic Prophylaxis in Patients Undergoing Mastectomy: A Survey of Members of the American Society of Breast Surgeons

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## ABSTRACT

**Background.** Surgical site infections after breast surgery range from 1 to 16%. Both the American Society of Breast Surgeons (ASBrS) and the American Association of Plastic Surgeons guidelines lack clarity on postoperative antibiotic prophylaxis (AP) after mastectomy. We surveyed the ASBrS membership to understand their practice patterns of AP after mastectomy and familiarity with ASBrS guidelines.

**Methods.** A self-designed, 19-question survey was emailed to all 2934 ASBrS members. Information was obtained on the participants' training, familiarity with ASBrS guidelines, and practices of prescribing perioperative AP after mastectomy with/without reconstruction and with indwelling drains.

**Results.** In total, 556 (19%) responses were analyzed. Half were fellowship-trained breast surgeons/surgical oncologists (50.2%), with 55.6% having practiced for > 15 years and 66.9% in community/private practice. Only 53.6% reported familiarity with ASBrS guidelines for perioperative AP. Most (> 90%) surgeons reported “always” placing drains after mastectomy and “always” prescribing preoperative AP. Postoperatively, preference for continuing AP in cases with drains in place varied by procedure: 7.7% when no reconstruction, 29.1% when autologous-

only, and 52.5% when implant reconstruction. Academic surgeons were less likely than surgeons in community/private practice to continue postoperative AP, whether for the duration of indwelling drains (5.1% versus 9.4%) or even till 7 days postoperatively (0.6% versus 3.2%) ( $p < 0.05$ ).

**Conclusions.** Surgeons uniformly adhere to ASBrS guidelines for preoperative AP. However, there is wide variation in AP postoperatively in patients with/without reconstruction and with indwelling drains. Our results highlight the need for high-quality evidence based on which guidelines must be updated, and the need to familiarize surgeons with current guidelines.

Contemporary evidence shows that the incidence of surgical site infections (SSI) after breast surgery ranges from 1 to 16%,<sup>1–5</sup> which is high for surgeries that are considered “clean procedures” as defined by the Centers for Disease Control and Prevention (CDC) wound classification system.<sup>3</sup> Apart from increasing postoperative morbidity, SSIs also increase costs and healthcare utilization.<sup>3,6</sup> Rates of SSI are higher in patients with locally advanced disease, larger breast size, or previous surgery or radiation, as well as in patients receiving neoadjuvant chemotherapy, undergoing longer operations, axillary dissection, synchronous bilateral procedures or breast reconstruction, or those with indwelling drains.<sup>3</sup>

A survey of the American Society of Breast Surgeons (ASBrS) membership in 2012 revealed wide variation in postoperative antibiotic prophylaxis prescribing practices for patients undergoing mastectomy, especially for cases with immediate reconstruction or those with indwelling

drains.<sup>7</sup> Level-1 evidence demonstrates that the use of perioperative prophylactic antibiotics (PPA) leads to lower rates of SSI for general surgical and orthopedic operations. As a result, the Centers for Medicare and Medicaid Services (CMS) incorporated antibiotic quality metrics (QMs) into the Physicians Quality Reporting System (PQRS).<sup>3</sup> ASBrS also revised its guidelines in 2018<sup>3</sup> and supports Surgical Care Improvement Project (SCIP) QMs for use of PPA in patients undergoing breast and axillary procedures, and recommends giving the first dose of antibiotic prophylaxis within 1 h of the surgical incision and discontinuing antibiotic prophylaxis within 24 h. The American Society of Plastic Surgeons (ASPS) also advocates for similar practice in patients who do not have drains in place.<sup>8</sup> However, the guidelines defining the role of antibiotics when drains are in place are less clear and are often left to surgeons' discretion. Moreover, if proximity of the drain to an implant is documented or if the antibiotic prophylaxis is switched to an oral regimen, it becomes SCIP compliant.<sup>3</sup> Current recommendations from multiple guidelines regarding perioperative antibiotic prophylaxis are summarized in Table 1.

Presently, there are limited data on the effectiveness of postoperative antibiotic prophylaxis after mastectomy, particularly in cases with indwelling drains. The resultant

ambiguity in clinical practice guidelines has the potential to manifest as widespread variation in patterns of antibiotic prophylaxis, and thus impact clinical outcomes. There is, however, a lack of recent data regarding current antibiotic prophylaxis practices among breast surgeons in this regard. Thus, this study reports patterns of antibiotic prophylaxis preoperatively and postoperatively, and highlights scenarios where there is a lack of evidence-based recommendations and decisions are left to surgeons' discretion, such as with indwelling drains.

## METHODS

### *Study Setting and Population*

A cross-sectional survey of the ASBrS membership was conducted from January to March 2021, after receiving ethical approval from the institutional review board of Aga Khan University Hospital (AKUH), Pakistan. The ASBrS was founded in 1995 and consists of almost 3000 members from the USA and over 50 other countries globally. Members include academic and community surgeons, as well as nonsurgeon physicians, allied health care professionals, residents, and fellows interested in breast disease. The target ASBrS membership for our survey were

**TABLE 1** Existing guidelines on the use of perioperative prophylactic antibiotics (PPA) for surgical site infection (SSI) prevention in patients undergoing mastectomy

Organization	Recommendation
American Society of Breast Surgeons (ASBrS)—2018 <sup>3</sup>	<p>PPA are indicated in patients undergoing mastectomy, with or without any type of axillary dissection or reconstruction, to prevent SSI</p> <p>A first-generation cephalosporin is the PPA of choice unless the patient is allergic/has a history of methicillin-resistant <i>Staphylococcal aureus</i> (MRSA) infection</p> <p>Continuation of antibiotics after the initial PPA is discouraged unless there is a specific clinical indication</p> <p>Quote ASPS Guidelines<sup>9</sup>: "If a drain is present, the role of antibiotics is less clear and should be left to physician preference... Overall, surgeons should adhere to their specific state and hospital guidelines on antibiotic administration"</p>
Surgical Care Improvement Project (SCIP)—2006 <sup>1</sup>	<p>PPA should be received within 1 h prior to surgical incision</p> <p>Choice of agent for PPA should be consistent with published guidelines</p> <p>Prophylactic antimicrobial discontinued within 24 h of surgery end time</p>
American Society of Plastic Surgeons (ASPS)—2014, <sup>9</sup> 2015 <sup>8</sup>	<p>Preoperative antibiotic prophylaxis is recommended for patients undergoing clean cosmetic breast surgery (with and without implant) to reduce risk of surgical-site infection</p> <p>Patients undergoing postmastectomy expander/implant breast reconstruction should receive a preoperative dose of an appropriate intravenous antibiotic initiated 60 min or less from the time of incision (within 2 h for antibiotics with longer infusion times). Unless a drain is present, PPA should be discontinued within 24 h of completion of the procedure</p> <p>If a drain is present, the role of antibiotics is less clear and should be left to physician preference. Of note, documenting a drain in proximity to the implant as a reason for continuation of intravenous antibiotics beyond the 24-h postoperative period or switching to postoperative antibiotics within 24 h of procedure completion is compliant with current SCIP guidelines. Presently, there is limited evidence on postoperative antibiotic prophylaxis. Overall, surgeons should adhere to their specific state and hospital guidelines on antibiotic administration</p>

independently credentialed breast, general, and gynecologic surgeons performing oncologic breast procedures. Trainees and respondents with incomplete survey responses were excluded.

### Survey Characteristics and Dissemination

Data were collected by means of a survey that was developed after extensive review of the literature. The survey was beta-tested among ten breast surgeons to gauge feasibility and comprehensibility, and areas warranting improvement were addressed. The final questionnaire, approved by Aga Khan University Hospital's institutional review board (IRB) and ASBrS Research Committee, consisted of 19 questions that explored participants' training, experience, region of practice, familiarity with ASBrS antibiotic prophylaxis guidelines, and their practice of prescribing PPA with/without reconstruction and with indwelling drains. To maintain anonymity, the questionnaire did not record surgeons' names. There were no risks, immediate benefits, or incentives for participation in the survey.

This voluntary survey, available in English only, was preceded by a consent form explaining the nature and intent of the questionnaire. Both were emailed to all members of the ASBrS (total population purposive sampling). Nonsurgeon members of the ASBrS were automatically directed to the end of the survey by means of a preliminary screening question at the start of the survey. Reminder emails were sent 30 and 45 days after the initial email. The survey closed at 60 days.

### Statistical Analysis

Data were analyzed using SPSS version 22. Descriptive statistics for categorical variables were presented as frequencies and percentages. Associations between surgeon characteristics and PPA-prescribing patterns were studied using chi-square and Fisher's exact test. A  $p$ -value of  $< 0.05$  was considered as significant throughout the study.

## RESULTS

### Demographics

A total of 614 of 2934 (20.9%) ASBrS members responded to the survey. After excluding trainees ( $n = 15$ ) and respondents with incomplete responses ( $n = 43$ ), a final sample of 556 surgeons (19% response rate) was analyzed.

Most respondents were fellowship-trained breast/surgical oncologists (50.2%) or general surgeons (49.3%), with

the vast majority (91.5%) practicing in USA. The other countries included Canada (2.2%), as well as countries in Asia (3.2%) and Europe (1.3%). Among surgeons practicing in USA, there was a fairly equal distribution of respondents across the four geographical regions. Two-thirds of surgeons belonged to community/private practices (66.9%), while 28.4% practiced in academic/university settings. The majority had  $> 15$  years of experience (55.6%) and had a breast-only practice (60.8%). Demographics are presented in Table 2.

Surgeons in the USA were more likely to have a breast-only practice than surgeons from other countries (63.3% versus 34%;  $p < 0.001$ ). However, breast surgeons in USA were more likely to perform only zero to one mastectomy

**TABLE 2** Demographic characteristics of surgeons

Variable	$n = 556$ $n$ (%)
<i>Qualification</i>	
Fellowship-trained breast surgeon/surgical oncologist	279 (50.2)
General surgeon	274 (49.3)
Obstetrician/gynecologist performing breast procedures	3 (0.5)
<i>Years in practice</i>	
< 1 year	9 (1.6)
1–5 years	77 (13.8)
6–10 years	84 (15.1)
11–15 years	77 (13.8)
> 15 years	309 (55.6)
<i>Country of practice</i>	
USA	509 (91.5)
Other	47 (8.5)
<i>Region in USA</i>	
South	158 (31.0)
Northeast	129 (25.3)
West	112 (22.0)
Midwest	110 (21.6)
<i>Setting of practice</i>	
Community/private practice	372 (66.9)
Academic/university practice	158 (28.4)
Other	26 (4.7)
<i>Percentage of practice dedicated to breast surgery</i>	
100% (breast-only practice)	338 (60.8)
51–99%	121 (21.8)
25–50%	68 (12.2)
< 25%	29 (5.2)
<i>Approximate number of mastectomies performed</i>	
0–1 per week	269 (48.4)
2–4 per week	266 (47.8)
5 or more per week	21 (3.8)

per week (50.1% versus 29.8%;  $p = 0.014$ ), while those from other countries were more likely to perform between two and four per week (68.1% versus 46%;  $p = 0.014$ ).

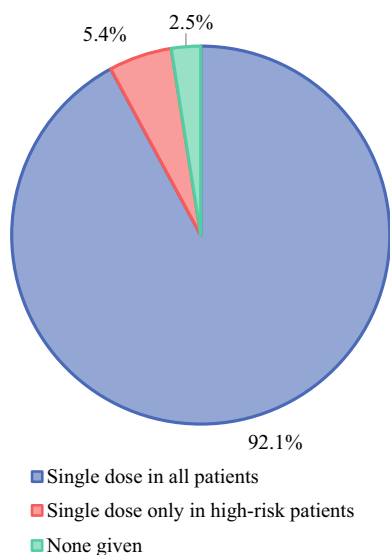
### Preoperative Antibiotic Prophylaxis

In patients undergoing mastectomy, irrespective of drain placement or reconstruction, 92.1% of surgeons reported that their patients routinely/“always” received preoperative antibiotic prophylaxis (Fig. 1). The most common choice of antibiotic was a cephalosporin (93.7%). Surgeons from other countries were less likely than surgeons in the USA to use cephalosporins (76.6% versus 95.3%), and more likely to use penicillins (12.8% versus 3.7%) or fluoroquinolones (4.3% versus 0%;  $p < 0.001$ ).

Surgeons practicing in the USA were significantly ( $p = 0.002$ ) more likely to routinely prescribe preoperative antibiotic prophylaxis (93.5% versus 76.6%), while those from other countries were more likely to “never” use preoperative antibiotic prophylaxis (8.5% versus 2%). Surgeons with a breast-only practice were significantly more likely to “always” give a single dose of preoperative antibiotic prophylaxis (94.1% versus 89%) and less likely to “never” administer preoperative antibiotic prophylaxis (1.2% versus 4.6%), as compared with surgeons without a dedicated breast-only practice ( $p = 0.030$ ).

### Postoperative Antibiotic Prophylaxis

Postoperative antibiotic prophylaxis patterns displayed considerable variation. In patients undergoing mastectomy without immediate reconstruction, 64.4% reported discontinuing antibiotics after a single preoperative dose, and



**FIGURE 1** Preoperative antibiotic prophylaxis practices

10.6% reported continuation of prophylaxis for 24 h postoperatively (Table 3). Others chose to either continue prophylactic antibiotics for the duration of indwelling drains (7.7%) or only in patients they considered at high risk (7.7%), or only used local antisepsis (chlorhexidine/betadine) at drain insertion site postoperatively. Rarely, surgeons even “routinely continued prophylactic antibiotics for 7 days postoperatively” (2.3%). The most common choice of antibiotic for postoperative antibiotic prophylaxis was also a cephalosporin (70.3%).

Surgeons with a breast-only practice were less likely to not administer postoperative antibiotic prophylaxis (59.5% versus 72%;  $p = 0.005$ ) and more likely to continue postoperative antibiotic prophylaxis for the duration of indwelling drains (9.8% versus 4.6%) or for patients they considered at high risk (9.2% versus 5.5%). Surgeons in USA were more likely to continue postoperative prophylaxis till only 24 h postoperatively (11.6% versus 0%), and less likely to continue antibiotic prophylaxis till 7 days postoperatively (1% versus 17%) or in those they considered at high risk (7.1% versus 14.9%;  $p < 0.001$ ).

### Drains and Prophylaxis

The vast majority of surgeons (93.7%) reported always placing drains when performing mastectomy without reconstruction. Only 42.1% of respondents allowed patients with drains to shower the day after surgery, while 21.8% did not allow patients to wet the drain site while drains were in place (Table 3). Surgeons with > 15 years of experience were significantly more likely to not allow their patients to wet the insertion site of an indwelling drain (27.2% versus 15%;  $p = 0.002$ ). Moreover, surgeons practicing in countries other than USA were significantly more likely to not allow patients with indwelling drains to wet the drain insertion site (31.9% versus 20.8%;  $p = 0.039$ ). Compared with those in community/private practice, surgeons practicing in academic settings were significantly less likely to continue postoperative antibiotic prophylaxis for the duration of indwelling drains (5.1% versus 9.4%) or till 7 days postoperatively (0.6% versus 3.2%) after mastectomy without reconstruction ( $p < 0.05$ ). Surgeons in community/private practices were more likely than those in academic/university settings to not allow patients with indwelling drains to wet the drain site (24.5% versus 12.7%;  $p = 0.012$ ).

In patients with indwelling drains, continued postoperative antibiotic prophylaxis was most commonly preferred in cases with implant-based reconstruction (52.9%), followed by autologous reconstruction (29.5%). Only 7.9% of surgeons routinely continued postoperative antibiotic prophylaxis in all patients with indwelling drains (Fig. 2).

**TABLE 3** Surgeons' practice patterns with regard to antibiotic prophylaxis

Question	N = 556 n (%)
In patients with indwelling drains:	
I allow patients to start showering the day after surgery (postoperative day 1)	234 (42.1)
I do not allow patients to wet the drain site while drains are in place	121 (21.8)
My instructions regarding wetting the drain site vary in those with and without reconstruction	111 (20.0)
I allow patients to shower when original dressing is removed (drain still in place)	90 (16.2)
In patients with indwelling drains, postoperative antibiotic prophylaxis is continued:	
Routinely in patients with no reconstruction	44 (7.9)
Only in cases with autologous reconstruction	164 (29.5)
Only in cases with implant-based reconstruction	294 (52.9)
Do not continue postoperative antibiotic prophylaxis except in high-risk* patients	54 (9.7)
In patients undergoing mastectomy without immediate reconstruction:	
I do not administer prophylactic antibiotics postoperatively	358 (64.4)
I continue prophylactic antibiotics for 24 h postoperatively	59 (10.6)
I continue prophylactic antibiotics for the duration of indwelling drains postoperatively	43 (7.7)
I continue prophylactic antibiotics postoperatively only in those I consider high-risk*	43 (7.7)
I only use local antisepsis (chlorhexidine/betadine) at drain insertion site postoperatively	40 (7.2)
I continue prophylactic antibiotics for 7 days postoperatively	13 (2.3)
In patients undergoing immediate reconstruction without implants (autologous):	
We continue prophylactic antibiotics for the duration of indwelling drains postoperatively	162 (29.1)
We do not continue prophylactic antibiotics postoperatively	130 (23.4)
We continue prophylactic antibiotics for 24 h postoperatively	118 (21.2)
We continue prophylactic antibiotics for 7 days postoperatively	84 (15.1)
We only use local antisepsis (chlorhexidine/betadine) at drain insertion site postoperatively	31 (5.6)
We continue prophylactic antibiotics postoperatively only in those I consider high-risk*	21 (3.8)
We do not use any perioperative (neither pre-nor postoperative) antibiotic prophylaxis	10 (1.8)
In patients undergoing immediate reconstruction with implants:	
We continue prophylactic antibiotics for the duration of indwelling drains postoperatively	292 (52.5)
We continue prophylactic antibiotics for 7 days postoperatively	130 (23.4)
We continue prophylactic antibiotics for 24 h postoperatively	62 (11.2)
We do not continue prophylactic antibiotics postoperatively	49 (8.8)
We only use local antisepsis (chlorhexidine/betadine) at drain insertion site postoperatively	14 (2.5)
We continue prophylactic antibiotics postoperatively only in those I consider high-risk*	5 (0.9)
We do not use any perioperative (neither pre-nor postoperative) antibiotic prophylaxis	4 (0.7)

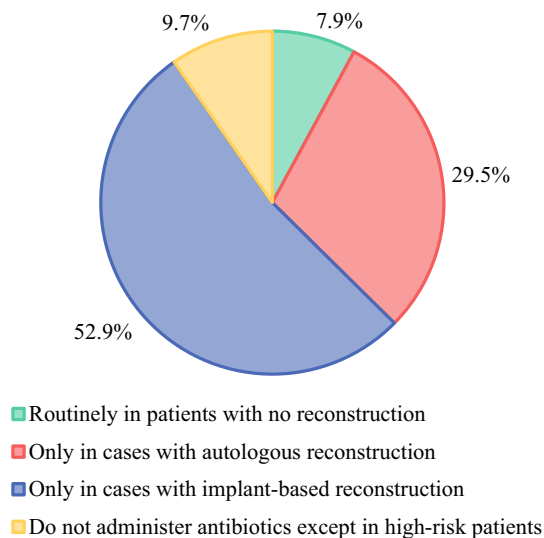
\*High-risk patients defined as those with comorbidity (diabetes, obesity, etc.) or those receiving neoadjuvant chemotherapy.

### Reconstruction and Prophylaxis

Almost two-thirds (66.2%) of respondents reported that > 50% of patients eligible for and offered immediate reconstruction, opted for it. This was most commonly performed by a board-certified plastics/reconstructive surgeon (96.4%). Thus, understandably, 89.6% of respondents reported that the decision to continue prophylactic antibiotics postoperatively was made by the plastics/reconstructive surgeon. Interestingly, compared with US surgeons, a significantly greater percentage of surgeons

from other countries reported that the decision to continue antibiotic prophylaxis postoperatively was made by the oncologic surgeon themselves (23.4% versus 1.4%;  $p < 0.001$ ). Moreover, surgeons with a breast-only practice were more likely to report > 50% of their eligible patients opting for immediate reconstruction (77.5% versus 48.6%;  $p < 0.001$ ).

Great variation was seen in the patterns of postoperative antibiotic prophylaxis given to patients by the surgical team (Table 3). Patients undergoing immediate autologous reconstruction were continued on postoperative



**FIGURE 2** Postoperative antibiotic prophylaxis practices amongst patients with indwelling drains

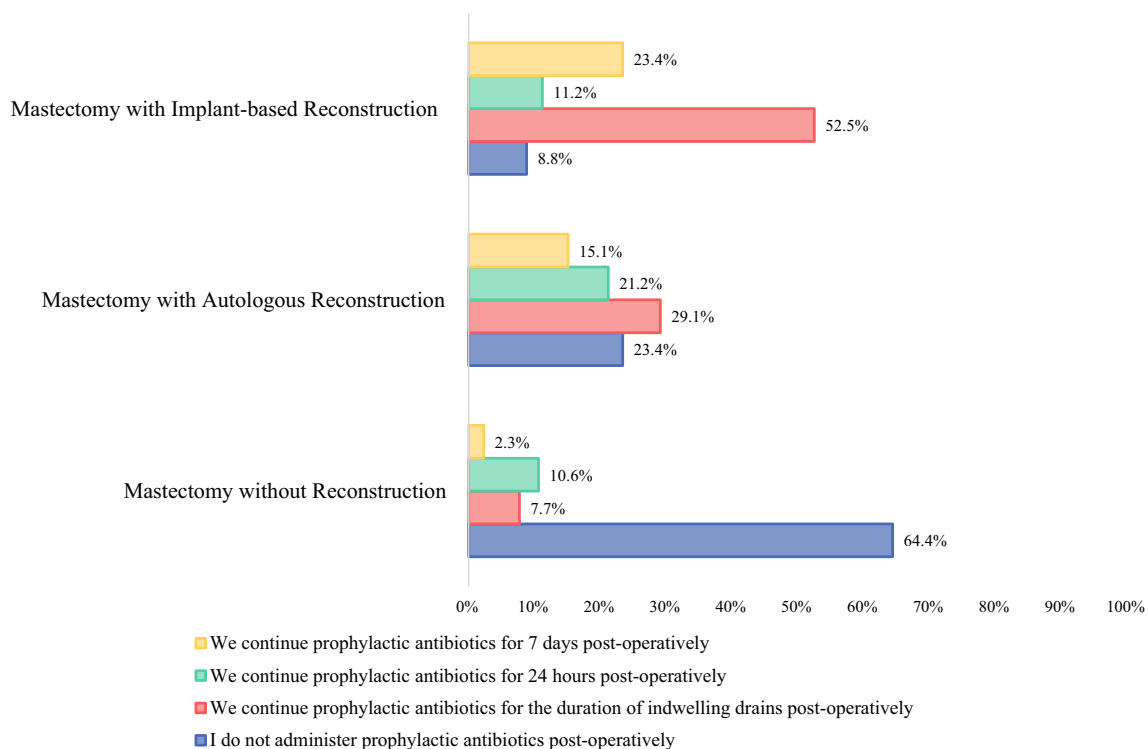
prophylactic antibiotics for the “duration of indwelling drains” (29.1%), for 24 h (21.2%), for 7 days (15.1%), or not at all (23.4%). Surgeons from outside the USA were more likely to routinely continue postoperative antibiotic prophylaxis for 7 days (36.2% versus 13.2%;  $p < 0.001$ ) in immediate autologous reconstruction.

When reconstruction with implants or expanders was performed, there was greater reliance on continuation of

antibiotics postoperatively, with a majority (52.5%) electing to continue postoperative antibiotic prophylaxis for the duration of indwelling drains, for 7 days (23.4%), or for 24 h (11.2%) postoperatively (Fig. 3). A greater percentage of surgeons with > 15 years of experience reported that their patients with implant-based reconstruction did not receive any postoperative antibiotic prophylaxis, as compared with surgeons with < 15 years of experience (11% versus 6.1%;  $p = 0.008$ ). Surgeons with a breast-only practice were less likely to not continue prophylactic antibiotics postoperatively (5.9% versus 13.3%;  $p = 0.001$ ). Surgeons from countries outside the USA were also less likely to continue prophylactic antibiotics postoperatively (4.3% versus 9.2%;  $p = 0$ ).

*ABrS Antibiotic Prophylaxis Guidelines*

Only 53.6% of respondents (all of whom were ASBrS members) reported being familiar with the ASBrS guidelines for perioperative antibiotic prophylaxis. Surgeons with > 15 years of experience (58.6% versus 47.4%;  $p = 0.008$ ) and those with a breast-only practice (59.8% versus 44%;  $p < 0.001$ ) were significantly more likely to be familiar with the ASBrS guidelines than those with < 15 years of experience and without a breast-only practice, respectively.



**FIGURE 3** Postoperative antibiotic prophylaxis in patients undergoing mastectomy

The supplementary table shows the complete set of responses regarding PPA-related practices recorded in the survey.

## DISCUSSION

While the ASBrS/SCIP guidelines are explicit about preoperative antibiotic prophylaxis, they leave much of the postoperative prophylaxis decision-making up to the surgeons' discretion, especially in cases with immediate reconstruction or in the presence of drains.<sup>1,3</sup> As expected, the results of our survey of the ASBrS members reflect the lack of clarity of these guidelines/recommendations.

This survey demonstrates uniformity in the choice of antibiotic (cephalosporins 93.7%) and the practice of preoperative antibiotic prophylaxis for mastectomy (92.1%), unaffected by choice of reconstruction or by use of drains. This is in keeping with SCIP guidelines, endorsed by the ASBrS.<sup>3</sup> However, there was widespread variation in the use of postoperative antibiotic prophylaxis among patients with drains, with and without immediate reconstruction.

While 64.4% of surgeons did not opt to continue postoperative antibiotic prophylaxis in cases without reconstruction, only 23.4% reported discontinuation of prophylaxis in cases of immediate autologous reconstruction and 8.8% in cases of implant-based reconstruction. The preference to discontinue prophylaxis postoperatively in the nonreconstructed category is significantly associated with practicing in an academic setting, indicating greater compliance with SCIP QMs.

Although most respondents seem to rely on prolonged antibiotic prophylaxis in immediate reconstruction, there does not appear to be a consensus on duration of postoperative prophylaxis. Moreover, there is an increased reliance on antibiotics after implant-based reconstruction, compared with autologous reconstruction. Within autologous reconstruction, there is a fairly even distribution between preference to discontinue prophylaxis postoperatively (23.9%), continue for 24 h postoperatively (21.3%), or continue for the duration of drains (29.4%). In contrast, in cases of implant-based reconstruction, there is a greater preference for continuing prophylaxis for the duration of indwelling drains (51.9%). While the Michigan Breast Reconstruction Outcome Study (2002)<sup>10</sup> demonstrated higher infection rates among expander/implant-based reconstruction compared with autologous reconstruction, a more recent review of 9230 women who had either autologous, prosthetic, or hybrid reconstruction showed no significant difference between infection rates after adjusting for confounders.<sup>11</sup>

Surgeons with a breast-only practice reported a greater reliance on antibiotic prophylaxis postoperatively not only in patients they considered at high risk but also in the nonreconstructed breast category, and were more likely to continue prophylaxis for the duration of indwelling drains. Surgeons from countries other than the USA were also more likely to continue postoperative antibiotic prophylaxis for 7 days in cases with immediate autologous reconstruction. Surgeons with > 15 years of experience were more likely to discontinue postoperative antibiotic prophylaxis in patients with implant-based reconstruction, as compared with surgeons with < 15 years of experience, perhaps indicating lack of comfort owing to lack of prospective data. Such widespread variation truly reflects a lack of consensus/guidelines, further exacerbated by surgeons' experience and country of practice. Additionally, varying SSI rates across different institutions<sup>12</sup> and settings may also lead to differing practices among surgeons. However, data regarding SSI rates across different perioperative antibiotic prophylaxis regimens do not appear to support these differing practices.

Though the ASPS endorses a single preoperative dose of antibiotics for mastectomy with implant-based reconstruction and suggests discontinuing antibiotics within 24 h in patients who do not have drains in place,<sup>8,9</sup> the guidelines lack clarity on recommended practice in the presence of indwelling drains. Moreover, the ASPS guidelines add a further tier of confusion by mentioning that the presence of a drain in proximity of an implant may be a reason for the continuation of antibiotic prophylaxis. High rates of infection, as reported by Hai et al. (a systematic review)<sup>12</sup> ranging from 2.1% to 31.6% among patients receiving standard of care as per ASPS guidelines (discontinuation within 24 h postoperatively after mastectomy with immediate reconstruction) perhaps lead to reluctance of surgeons to discontinue antibiotics, especially where guidelines may allow room to justify longer use of prophylaxis. Moreover, in patients receiving similar perioperative systemic antibiotic prophylaxis, the addition of topical antibiotics may also decrease the risk of SSIs.<sup>12</sup> Even when a systematic review, such as by Wang et al.,<sup>13</sup> suggested no difference in SSI incidence among patients receiving antibiotics for more versus less than 24 h postoperatively, after mastectomy with immediate implant-based reconstruction, the authors were cautious in their recommendations and stressed the need for future prospective trials to provide high-quality evidence.<sup>13</sup> Their caution perhaps reflects the paucity of evidence as their review included only one randomized controlled trial.

In theory, bacterial colonization of drains might predispose to SSI postmastectomy, partly by acting as a conduit for bacterial entry.<sup>14</sup> Up to one-third of drains may be colonized after 1 week postmastectomy, and more than

two-thirds by the second week postprocedure.<sup>15</sup> However, evidence suggests that continuation of postoperative antibiotic prophylaxis in addition to preoperative dosages does not further reduce SSI rates.<sup>16</sup> Moreover, there is also evidence from clinical trials that routine use of preoperative prophylaxis with a cephalosporin does not significantly lower SSI rates after mastectomy with drain placement.<sup>17,18</sup> It is possible that bacteria colonizing drains may not possess sufficient pathogenicity to cause markedly increased rates of SSI. Additionally, while local antiseptics (chlorhexidine disc dressing and hypochlorite rinses of the drain bulb) may decrease bacterial colonization,<sup>14,19</sup> it may not necessarily lead to significantly reduced SSI.<sup>19</sup> Less than 10% of surgeons in our study reported its sole use as postoperative prophylaxis in mastectomy with or without reconstruction.

The 2012 ASBrS membership survey, conducted prior to the 2018 ASBrS recommendations, also showed great variation in surgeons' practice of postoperative antibiotic prophylaxis in breast and axillary procedures requiring drains, regardless of reconstruction.<sup>7</sup> Our survey, conducted a decade later in 2021, once again shines a spotlight on similar issues. In addition, just over half of the sampled ASBrS membership declared themselves aware of the ASBrS guidelines on perioperative prophylaxis, with less experienced surgeons and those without a breast-only practice being less aware. Thus, apart from the lack of sufficient evidence and clear guidelines, a lack of awareness of existing guidelines may further exacerbate differences in practice. The results of our study provide fresh evidence for the acute need for clinical trials and large-scale international surgical collaborative studies to substantiate evidence-based antibiotic prophylaxis practices, as well as for the need to build awareness among the community of breast surgeons regarding current best practices. An ongoing randomized controlled trial by the current research team aims to help fill some of the gaps in evidence.<sup>20,21</sup> Awareness-building interventions can be designed in the form of periodic optional training modules for ASBrS members, or attractive infographics disseminated routinely via email. The need to intervene is all the more urgent given the growing global focus on healthcare utilization and costs, as well as antimicrobial stewardship.

This study has a few limitations of note. Less than 10% of respondents belonged to countries besides the USA. However, within the USA, the sample included surgeons across geographic regions and settings of practice (community/private or academic), boosting the generalizability of our results. The characteristics of respondents in our study, particularly geographic region, setting of practice, and percentage of practice dedicated to breast surgery, are similar to those seen in previous surveys of the ASBrS membership, further ensuring the generalizability of our

findings.<sup>22</sup> Another limitation is the lack of comprehensiveness of the survey, which may have overlooked subtler variations in practice in a bid to shed light on specific problems. Additionally, the mode of dissemination (via email) may have led to a selection bias, while the nature of the questions (pertaining to adherence to clinical best practices) may have elicited response bias from surgeons. Lastly, as the target population consisted only of ASBrS membership, our survey did not include the perspectives of plastic/reconstructive surgeons, even though they perform the majority of immediate reconstructions. This highlights a gap that future studies can aim to fill.

## CONCLUSION

While there is adherence to SCIP, ASBrS and ASPS guidelines of prescribing preoperative antibiotic prophylaxis for mastectomy, there is obvious lack of comfort with discontinuation of antibiotic prophylaxis postoperatively in reconstruction, especially with drains. Though guidelines recommend discontinuing antibiotics postoperatively, there is a need to familiarize the ASBrS members with existing guidelines. Because of lack of uniformity in SSI definitions, differences in interpretation of perioperative antibiotic prophylaxis guidelines, quality of the available data, and inclusion of different types of breast operation in most studies, there is a need for randomized control trials (RCTs) to bridge gaps in the literature and achieve standardization in practice. There is also a need to educate breast surgeon members of the ASBrS on current perioperative prophylaxis guidelines.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1245/s10434-022-12223-7>.

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